Economic Analysis of PEMFC Systems (New FY 2004 Project)

Harry J. Stone
Battelle
655 Eden Park Dr., Suite 540
Cincinnati, OH 45202
Phone: (513) 362-2602; Fax: (513) 362-2610; E-mail: stoneh@battelle.org

DOE Technology Development Manager: Kathi Epping
Phone: (202) 586-7425; Fax: (202) 586-9811; E-mail: Kathi.Epping@ee.doe.gov

Objectives

- **Task 1:** Perform a study focusing on fuel cell technology, market, economic, and environmental analyses. The objective will be to develop a complete understanding of fuel cell technology, potential fuel cell capacity, the energy market, market size and potential in a wide range of possible stationary building applications, supply curves for promising fuel cell markets, and government policies and impacts. This knowledge will enable analyses of the economics and national impacts of the technology.
- **Task 2:** Employ the Interactive Future Simulations (IFS™) software to generate alternative scenarios to determine the commercial viability of fuel cells by the year 2020. (IFS™ software is commercial computer software owned by Battelle.) The future economic viability and impacts of fuel cells in the U.S. are highly uncertain and based on widely diverging market conditions. Anticipating these diverging market conditions is indispensable for understanding and influencing the actions required to encourage the successful commercialization of fuel cells.
- **Task 3:** Develop a stakeholder's forum for:
  - Focused investigations of critical issues and identification of foremost industry, government, and other consumer needs;
  - Identification of critical success factors and principal barriers;
  - Development of strategies and partnerships for addressing barriers;
  - Development of training modules and communications tools.
- **Task 4:** Establish the PEM Fuel Cell Center (***One-Stop Information Center for PEM Fuel Cells*** website). There is a considerable amount of research being conducted by federal laboratories and the private sector, as well as a number of university research centers. Presently, there is no single repository for proton exchange membrane (PEM) fuel cell information. The information center will inventory or link to information and educational resources that presently exist, while augmenting the information with the results from other work completed as part of this project. The Center's website will have several access areas that will be tailored to meet the information demands of distinct stakeholder groups. Public policy will impact both time-to-market and the speed of market penetration of PEM fuel cells. Battelle will provide expertise to support policy development and analysis. This will include, as demanded by policy-makers, forums and seminars on targeted aspects of the PEM fuel cell policy environment.

Technical Barriers

This project addresses the following technical barriers from the following sections of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year R,D&D Plan:

Fuel Cells

- D. Fuel Cell Power System Benchmarking

Education

- B. Lack of Demonstrations or Examples of Real World Use
- C. Institutional Barriers and Access to Audiences
- D. Regional Differences

Approach

Battelle will complete a comprehensive four-task action plan/process that includes technology-economic, contingent valuation, and forecasting assessments to identify critical success factors in the commercialization of fuel cells. Battelle will also initiate a formal stakeholder involvement process to govern our assessments and to share information critical to promoting user acceptance of this technology.

In Task 1, Battelle will evaluate the economic variability of stationary PEM fuel cells of different sizes (1, 5, 25, 100, and 250 kW), operated as stand-alone, distributed generators (DGs) and as combined heat and power (CHP) systems. Battelle will solicit extensive stakeholder involvement, specifically from industry, academia, and research institutes, to gather accurate information on systems, technology performance, developmental status, applications, and economics.

In Task 2, since the future of PEM fuel cells is highly uncertain, Battelle will use a proven, computer-based method to generate alternative futures or scenarios. In each scenario, we will identify defined alternative outcomes, such as rapid market penetration of PEM fuel cells in the application of stationary power. Each scenario will be different, which will allow us to see the total sets of conditions associated with the rapid market penetration. Battelle will identify the most important trends, issues, and factors to be included in the scenarios.

In Task 3, a stakeholder group will be formed that represents a balance among interests in the fuel cell industry, academia, government, non-profit organizations, consumers, and, as they are identified, target markets such as electric power generators. Battelle will solicit and carefully manage the involvement of technology developers or vendors to provide an unbiased opinion of technology commercialization options. Developers and vendors may act as members of the stakeholder group to the extent that they represent the general technology area, or an association of developers or users. The collaboration among stakeholder group members also will enrich the development of effective communications tools for educating the broader stakeholder community.

In Task 4, Battelle will focus on three key objectives in facilitating the commercialization of PEM fuel cells:

- Improving understanding of the technology in target markets. Providing information and tools to target markets will enable informed decisions about the uses and applications of PEM fuel cells.
- Enhancing the technology's competitiveness. PEM fuel cells will compete with other energy technologies on a mix of attributes that will include the pure economics of cents/kW. Battelle will provide information to the PEM fuel cell industry to enhance understanding of other factors important to develop for and convey to promising target markets.
- Collecting data on emerging technologies. Battelle will actively search for technologies that could reduce the cost of fuel cells, thereby improving their competitiveness in the marketplace. These innovations will be communicated to the PEM fuel cell industry.